

## WHAT IS CLAIMED IS:

1. A carbonaceous complex structure comprising a layered set of a substrate, a carbonaceous thin film and a fullerene thin film.
2. The carbonaceous complex structure according to claim 1 wherein said carbonaceous thin film and the fullerene thin film are layered in this order on a smooth surface of said substrate.
3. The carbonaceous complex structure according to claim 2 wherein said smooth surface of said substrate has a roughness Ra of not larger than  $1\ \mu\text{m}$ .
4. The carbonaceous complex structure according to claim 1 wherein a first electrode, said carbonaceous thin film, said fullerene thin film and a second electrode are layered in this order on said substrate.
5. The carbonaceous complex structure according to claim 4 wherein said substrate and the first electrode are transparent.
6. The carbonaceous complex structure according to claim 1 wherein said carbonaceous thin film and a pair of electrodes are layered in this order on said substrate and wherein said fullerene polymer film is formed at least between said electrodes.
7. The carbonaceous complex structure according to claim 1 wherein said carbonaceous thin film is formed by thermal decomposition of an organic compound.
8. The carbonaceous complex structure according to claim 1 wherein said fullerene thin film is a fullerene polymer film or a fullerene vapor-deposited film.

9. The carbonaceous complex structure according to claim 8 wherein said fullerene polymer film is a film polymerized on illumination of electromagnetic waves.

10. The carbonaceous complex structure according to claim 9 wherein said fullerene polymer film is a polymerized film of said vapor-deposited film formed to a pre-set thickness.

11. The carbonaceous complex structure according to claim 9 wherein said fullerene molecules are  $C_{60}$  or  $C_{70}$  or a mixture thereof and wherein said electromagnetic waves are RF plasma, UV rays or an electron beam.

SUB B<sub>3</sub> > 12. A method for manufacturing a carbonaceous complex structure comprising:

a step of forming a carbonaceous thin film on a substrate by thermal decomposition of an organic compound and

a step of forming a fullerene thin film.

13. The method for manufacturing a carbonaceous complex structure according to claim 12 wherein

said carbonaceous thin film and the fullerene thin film are formed in this order on a substrate.

14. The method for manufacturing a carbonaceous complex structure according to claim 13 wherein

the roughness Ra of said smooth surface of said substrate is set to not larger than 1  $\mu\text{m}$ .

SUB B<sub>4</sub> > 15. The method for manufacturing a carbonaceous complex structure according to

claim 14 wherein

a first electrode, said carbonaceous thin film, said fullerene polymer film and a second electrode are layered in this order on said substrate.

16. The method for manufacturing a carbonaceous complex structure according to claim 15 wherein

said substrate and the first electrode are transparent.

SUB B<sub>5</sub> 17. The method for manufacturing a carbonaceous complex structure according to claim 12 wherein

said carbonaceous thin film and a pair of electrodes are layered in this order on said substrate and wherein said fullerene polymer film is formed at least between said electrodes.

18. The method for manufacturing a carbonaceous complex structure according to claim 12 wherein

SUB B<sub>6</sub> said carbonaceous thin film is formed by thermal decomposition of an organic compound.

19. The method for manufacturing a carbonaceous complex structure according to claim 12 wherein

said fullerene thin film is formed by a fullerene vapor deposition method or a fullerene polymerization method.

SUB B<sub>6</sub> 20. The method for manufacturing a carbonaceous complex structure according to claim 19 wherein

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a plasma polymerization method, a micro-wave polymerization method, an electrolytic polymerization method, an electron beam polymerization method, an X-ray polymerization method or a photopolymerization method.

21. The method for manufacturing a carbonaceous complex structure according to claim 12 wherein

said fullerene molecules are vapor deposited to form a vapor-deposited film which then is illuminated by electromagnetic waves to polymerize said fullerene molecules to produce a fullerene polymer film which is used as a constituent layer of the carbonaceous complex structure.

22. The method for manufacturing a carbonaceous complex structure according to claim 21 wherein

the film thickness of a vapor-deposited film of said fullerene molecules is measured and controlled in vapor-depositing said fullerene molecules to form a vapor-deposited film of a pre-set thickness which then is polymerized by illumination of said electromagnetic waves.

23. The method for manufacturing a carbonaceous complex structure according to claim 22 wherein

said film thickness is measured by a film thickness meter arranged in said vacuum chamber.

24. The method for manufacturing a carbonaceous complex structure according to claim 21 wherein said fullerene molecules are  $C_{60}$  or  $C_{70}$  or a mixture thereof and

